Ministry of Higher Education and Scientific Research
Scientific Supervision and Evaluation Authority
Quality Assurance and Academic Accreditation Department
International Accreditation Department

Academic Program and Course Description Guide

2025

Introduction

The academic program is a coordinated and organized package of courses that include procedures and experiences organized in the form of study vocabulary, the main purpose of which is to build and refine the skills of graduates, which makes them qualified to meet the requirements of the labor market. It is reviewed and evaluated annually through internal or external audit procedures and programs, such as the external examiner program. The academic program description provides a brief summary of the main features of the program and its courses, indicating the skills that students are working to acquire based on the objectives of the academic program. The importance of this description is evident in that it represents the cornerstone in obtaining program accreditation and participates in writing the teaching materials under the supervision of the scientific committees in the scientific departments. This guide, in its second version, includes a description of the academic programs after updating the vocabulary and paragraphs of the previous guide in light of the developments and changes in the educational system in Iraq, which included a description of the academic program in its traditional form (annual, semester) system, in addition to adopting the description of the academic program circulated under the letter of the Department of Studies No. 2906/3 dated 5/3/2023 regarding the program for its work. In this field, we seek to emphasize the importance of writing a description of the academic program and courses to ensure the smooth running of the educational process.

Concepts and Terms

1. Academic Program Description: *The academic program description provides a comprehensive overview of the program's vision, mission, objectives, and educational outcomes. This description serves as a strategic reference for achieving academic development, and accurately identifies how the program will be implemented to effectively achieve its objectives.*

2. Course Description: *Provides a brief and accurate description of each course, including its objectives and expected outcomes. The description should include clear details on how to make the most of the offered course material, and whether the student has acquired the required skills and knowledge.*

3. Program Vision: *The vision expresses the program's future aspirations. The program seeks to be a pioneer and distinguished locally and internationally, with a focus on innovation and quality in education, and achieving sustainability in providing educational programs that are in line with the needs of society and the labor market.*

4. Program Mission: *The mission clarifies the general objectives that the program seeks to achieve through education and learning. The mission includes an outline of how to develop students' capabilities and prepare them for the labor market in innovative and modern ways that are in line with technological and cognitive changes.*

5. Program Objectives: *A set of specific objectives that the program seeks to achieve over a specific period of time. These objectives include developing the student's knowledge and skills in measurable and evaluable ways, which contributes to improving the quality of the educational process and achieving distinguished educational outcomes.*

6. Curriculum: *The curriculum includes all the courses offered by the program, whether theoretical or practical. The plan is integrated with the educational strategies used, and takes into account the number of study hours for each course to ensure a balance between theoretical and applied content.*

7. Learning Outcomes: *Learning outcomes represent a set of skills and knowledge that the student must acquire by the end of the academic program successfully. These outcomes are determined based on the program objectives, and are an important tool for evaluating the effectiveness of education and ensuring the achievement of high-quality educational outcomes.*

8. Teaching and Learning Strategies: *These are the strategies used by the faculty to ensure the achievement of the educational objectives of the program. These strategies include the use of various methods in education such as interactive learning, e-learning, in addition to classroom and extracurricular activities that contribute to enhancing a deep understanding of the educational content and achieving the required learning outcomes.*

Conclusion By *preparing this comprehensive academic description, we hope that the program will be able to meet the highest standards of academic quality, and will contribute effectively to improving educational outcomes and developing student skills in line with the requirements of the modern labor market. Through this guide, we aspire to raise the level of academic education and contribute to enhancing the university's position locally and internationally.*

Republic of Iraq
Ministry of Higher Education & Scientific Research
Supervision and Scientific Evaluation Directorate
Quality Assurance and Academic Accreditation
International Accreditation Dept.

Academic Program Specification Form for The Academic Year 2024-2025

University: Northern Technical University
College: Hawija Technical Institute
Dept.: Power Mechanics Techniques
Date of Form Completion :16-2-2024

Department Head Name/ Qusay Kamil Jasim
Date: 17/2/2025
Signature

Department Head Name: Dr. Mohammed Jyad
Date: 17 / 2 /2025
Signature

Quality Assurance And University Performance Manager

Data: 17 / 2 /2025

Signature

Dean's approval

PROGRAMME SPECIFICATION

This academic program description provides a concise summary of the main features of the program and the learning outcomes expected of the student to achieve, proving whether he has made maximum use of the available opportunities. It is accompanied by a description of each course within the program

1. Teaching Institution	Northern Technical University/ Hawija Technical Institute
2.University Department/Centre	Power Mechanics techniques
3.Program Title	Technical Sciences
4.Title of Final Award	Technical Diploma
5. The school system: Annual / Courses / Other Annual	Courses system
6. Accreditation	**ABET Academic Accreditation Program for Engineering and Technology**
7. Other external influences	
8. Date of production/revision of this specification	*17-2-2025*
9. Aims of the Program	

The power generation branch aims to prepare the technical staff that will be the link between the specialist and the skilled worker. The scientific branch prepares the graduate and provides him with theoretical, applied and practical information to be able to carry out the work assigned to him. Besides that; Work in power plants of various types (steam, gas, hydroelectric, diesel ... etc.) with the operation of components and their units; Carry out emergency and periodic maintenance work for the components and units of the various stations, along with their measuring devices; Working in pumping stations, operating and maintaining their various components.

Automobile Techniques Branch: aims to prepare the technical staff that will be a link between the specialist and the skilled worker. The department prepares and prepares the graduate and provides him with theoretical, applied and practical information to be able to carry out the work entrusted to him. Besides that, the ability to identify mechanical and electrical faults in cars; Carrying out regular maintenance for gasoline and diesel cars; The ability to manage and operate service and maintenance stations.

1. Learning Outcomes, Teaching, Learning and Assessment Methods

A. Knowledge and Understanding

A1- Knowing how parts and components work in cars, both types: diesel and gasoline.
A2- Knowing how to diagnose faults in cars
A3- Knowing the diagnosis of faults in electrical power production stations
A4- Knowing how to perform periodic maintenance of devices, systems and equipment at work sites.
A5- Transfer the above-mentioned theoretical information to the skilled worker.

B. Subject-specific skills

B1 - The ability to maintain and repair parts and components for cars (diesel and gasoline).
B2 - The ability to maintain and repair parts and components of electrical power production plants and systems.
B3 - The ability to operate electric power stations and water pumping stations.

Teaching and Learning Methods

Lectures, workshops, laboratories, methodological training, summer training, as well as scientific visits to various electric power plants.

Assessment methods

Oral exams, written exams, quarterly exams, final exams, daily assessment, practical exams in laboratories, and weekly reports.

C. Thinking Skills (Emotional and Value Objectives):

C1- Increasing the awareness of the student during education.
C2 - The student's participation in class activities and the delivery of the assignment on time.
C 3- Adherence to the rules of occupational safety while working in laboratories.
C4-Attention control and attention test (selective attention).
C5- Increasing the students' self-confidence.
C6- Managing time and not wasting it.
C7- Increasing the spirit of competition and enthusiasm among students.

Teaching and Learning Methods

1- Listen carefully to the teacher’s explanation.
2- Knowing the role of science and scientists in life.
3- Encourage and motivate the student to contribute to the explanation and discussion and increase his interaction in the class.
4- The student's interest in the calm and cleanliness of the class.

Assessment methods
1- Observe the student through his posts. 2- Interviewing the student for practical tests. 3- The student's cumulative record through educational committees located in the department. 4- Giving the student homework and asking to solve certain problems.
D- General and transferable skills (other skills relevant to employability and personal development). D1- Using the computer and the Internet to understand the working mechanism of some complex parts of the specialty. D2 - Using the computer in engineering and industrial drawing D3 - Using modern measurement and control equipment to conduct laboratory experiments. D4 - Using modern inspection techniques in diagnosing malfunctions of devices and equipment and determining ways to fix them.
Teaching and Learning Methods
1- Explanation and clarification in the lectures. 2- Practical lessons in workshops and laboratories. 3- Reports. 4- Graduation projects for students. 5- Summer training. 6- Systematic training. 7- Discussion seminars. 8- Guidance seminars
Assessment methods
1- Theoretical tests (oral and written). 2- Practical tests. 3- Semester and final exams. 4- Daily evaluation. 5- Reports.

11. programme structure

Courses for the two branches:

1. Automobile techniques/ first year

Seq	Subject	Theoretical (hours)	Practical (hours)	Total	Units	Notes
1	Human Rights and Democracy	**2**	**0**	**2**	**2**	Public
2	English Language 1	**2**	**0**	**2**	**2**	Public
3	Principles of Computer 1	**1**	**1**	**2**	**2**	Assistant
4	Arabic Language	**2**	**0**	**2**	**2**	Public
5	Mathematic 1	**2**	**0**	**2**	**2**	Assistant
6	Mathematic 2	**2**	**0**	**2**	**2**	Assistant
7	Mechanical Workshops	**0**	**3**	**3**	**3**	Specialized
8	Workshops	**0**	**3**	**3**	**3**	Specialized
9	Automotive Engines Maintenance1	**2**	**4**	**6**	**6**	Specialized
2	Automotive Engines Maintenance2	**2**	**4**	**6**	**6**	Specialized
11	Automotive Electrics and Electronics1	**2**	**2**	**4**	**4**	Specialized
12	Automotive Electrics and Electronics 2	**2**	**2**	**4**	**4**	Specialized
13	Thermodynamics	**2**	**2**	**4**	**4**	Specialized
14	Heat Transfer and Fluid	**1**	**2**	**3**	**3**	Specialized
15	Engineering Mechanics	**2**	**1**	**3**	**3**	Specialized
16	Engineering Drawing1	**0**	**3**	**3**	**3**	Assistant
2025	Engineering Drawing2	**0**	**3**	**3**	**3**	Assistant
	Total Hours	**24**	**30**	**54**	**54**	

Automobile Techniques/ Second Year

Seq	Subject	Hours			Units	Type
		Theo.	practical	Total		
1	English Language 2	2	0	2	2	Public
2	Ethics of the Profession	2	0	2	2	Public
3	The crimes of the Baath regime in Iraq	2	0	2	2	Public
4	Arabic language	2	0	2	2	Public
5	Maintenance of automotive mechanical power transmission systems1	2	4	6	6	Specialized
6	Automotive electronic control systems1	2	2	4	4	Specialized
7	Internal Composition Engine1	2	2	4	4	Specialized
8	computer aided Engineering drawing for automotive parts	0	6	6	6	Assistant
9	Automotive Bodywork1	1	2	3	3	Specialized
2	Automotive Electrical and electronics1	1	2	3	3	Specialized
11	Maintenance brake, suspension and steering systems in the Automotive2	2	4	6	6	Specialized
12	Automotive electronic control systems2	2	2	4	4	Specialized
13	Internal Composition Engine2	2	2	4	4	Specialized
14	Automotive mechanics	4	0	4	4	Specialized
15	Automotive Bodywork2	1	2	3	3	Specialized
16	Automotive Electrical and electronics2	1	2	3	3	Specialized
2025	Project	0	3	3	3	Specialized
	Total hours	28	33	61	61	

Power Generation techniques/ first year

eq	Subject	Theoretical (hours)	Practical (Hours)	Total (Hours)	Units	Notes
1	Human Rights and Democracy	**2**	**0**	**2**	**2**	Public
2	English Language 1	**2**	**0**	**2**	**2**	Public
3	Principles of Computer 1	**1**	**1**	**2**	**2**	Assistant
4	Arabic Language	**2**	**0**	**2**	**2**	Public
5	Mathematic 1	**2**	**0**	**2**	**2**	Assistant
6	Mathematic 2	**2**	**0**	**2**	**2**	Assistant
7	Mechanical Workshops1	**0**	**3**	**3**	**3**	Specialized
8	Mechanical Workshops 2	**0**	**3**	**3**	**3**	Specialized
9	Thermodynamics	**2**	**2**	**4**	**4**	Specialized
2	Electrical technology1	**2**	**2**	**4**	**4**	Specialized
11	Fluid	**2**	**2**	**4**	**4**	Specialized
12	Engineering Mechanics1	**2**	**2**	**4**	**4**	Specialized
13	Engineering Drawing1	**0**	**3**	**3**	**3**	Assistant
14	Heat Transfer	**2**	**2**	**4**	**4**	Specialized
15	Engineering Drawing	**0**	**3**	**3**	**3**	Assistant
16	Hydraulic Machines	**2**	**2**	**4**	**4**	Specialized
2025	Electrical technology	**2**	**2**	**4**	**4**	Specialized
18	Engineering Mechanics	**2**	**2**	**4**	**4**	Specialized
	Total Hours	**27**	**29**	**56**	**56**	

Power Generation techniques/ Second year

Seq	Subject	Hours			Units	Notes
		Theo.	Prac.	T		
1	English Language 2	2	0	2	2	Public
2	Ethics of the Profession	2	0	2	2	Public
3	The crimes of the Baath regime in Iraq	2	0	2	2	Public
4	Arabic language	2	0	2	2	Public
5	Measurement Instruments1	2	2	4	4	Specialized
6	Hydraulic & Pneumatic Systems1	2	2	4	4	Specialized
7	Gas Turbine and Diesel Power Plant Technology1	2	3	5	5	Specialized
8	Steam Power Plant Technology1	2	3	5	5	Specialized
9	Electrical Technology1	2	2	4	4	Specialized
2	Industrial Drawing	0	3	3	3	Assistant
11	Measurement Instruments2	2	2	4	4	Specialized
12	Hydraulic & Pneumatic Systems2	2	2	4	4	Specialized
13	Gas Turbine and Diesel Power Plant Technology2	2	3	5	5	Specialized
14	Steam Power Plant Technology2	2	3	5	5	Specialized
15	Electrical technology	2	2	4	4	Specialized
16	Project	0	3	3	3	Specialized
	Total	28	30	58	58	

12. Personal Development Planning
1. Using modern resources, whether in the library or the Internet 2. Participation in training courses inside and outside the institute. 3. Technical and administrative advice. 4. Preparing applied and field research. 5. Preparing educational bags. 6. Cooperation with departments and institutions in the governmental and private sectors in the field of training, supervision and consultancy.
13. Admission criteria (setting regulations related to joining the college or institute)
1- Adoption of the average of student's credits on the basis of central acceptance by the Ministry of Higher Education and Scientific Research 2- The type of branch from which the student graduated, including: A- Scientific B- Professional (industrial). 3- The interview: where a committee of the department's lecturers is formed for the purpose of interviewing the students. 4- Medical examination for students.
14. The key sources of information about the programme
1. Textbooks approved by the Northern Technical University. 2. The resources available in the institute's library or on the Internet.

Curriculum Skills Outline																	
Please check the boxes corresponding to the individual learning outcomes from the program being evaluated																	
			Learning outcomes required from the program														
year/level	Course Name	basic or optional	Cognitive goals				Program specific objectives				Emotional and value goals				Transferred general and qualification skills (other skills related to employability and personal development)			
			A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4	D1	D2	D3	D4
FIRST	Engineering Thermodynamics	primary	¶	¶	¶	¶	¶	¶	¶	¶	¶	¶	¶	¶	¶	¶	¶	¶
	Automobile electricity	primary	¶	¶	¶	¶	¶	¶	¶	¶	¶	¶	¶	¶	¶	¶	¶	¶
SECOND	Automotive Maintenance	primary	¶	¶	¶	¶	¶	¶	¶	¶	¶	¶	¶	¶	¶	¶	¶	¶
	Automobile Electricity (2)	primary	¶	¶	¶	¶	¶	¶	¶	¶	¶	¶	¶	¶	¶	¶	¶	¶

Course description form

Course description

This course description provides a brief summary of the most important characteristics of the course and the learning outcomes expected of the student to achieve, demonstrating whether he has made the most of the available learning opportunities. It must be linked to the description of the program.

1. Teaching Institution	Northern Technical University/ Hawija Technical Institute
2. University Department/Centre	Power Mechanics techniques
3. Course name/code	Automotive maintenance
4. Forms of attendance available	Weekly
5. Semester/year	Courses system
6. Number of hours of study (total)	240 (8 hours per week)
7. Date this description was prepared	*16 / 2 /2024*
8. Aims of the course	
The student understands the parts and malfunctions of the engine, gearbox, clutch, transmission, front axle, rear axle, stops, car air conditioners, steering and steering group, and how to maintain these parts and make the necessary and required repairs.	

2. Course outcomes, Teaching, Learning and Assessment Methods
A - knowledge and understanding. A1- The mechanism of action of the clutch. A2-Knowing the mechanism of work of the powertrain. A3- Knowing the working mechanism of the front axle and the rear axle. A4-Knowing the mechanism of work of air conditioning devices in the car. A 5- Knowing how the engine works. A6- Knowing how the switch works.
B - Subject-specific skills B1 - Ability to maintain and repair the clutch B2 - Ability to maintain and repair the powertrain B3 - Ability to maintain and repair the front axle and rear axle B 4- The ability to maintain and repair the air-conditioning devices in the car

Teaching and learning methods
(Lecture, workshop, laboratory, summer training, methodological training)
Evaluation methods
Oral exams, written exams, semester exams, final exams, daily assessment
C- thinking skills C1- Graduation projects C2 - Classroom and extra-curricular assignments and reports. C3 - competitions and workshops. C4- Innovations and patents.
Teaching and learning methods
1- (Lecture, workshop, laboratory, summer training, methodological training)
Evaluation methods
Oral exams, written exams, semester exams, final exams, daily assessment
D - General and transferable skills (other skills related to employability and personal development). D1-Using the computer and the Internet to understand the working mechanism of some complex parts of the field D2 - Using the computer in engineering and industrial drawing D3 - Using modern electronic display methods to display pictures and videos related to the subject. D4 - Using modern inspection equipment to check the different parts and systems of cars.

11. Course Structure					
week	hours	Required Learning Outcomes	Unit Name/Subject Method	Teaching Method	Assessment method
1	8	Knowing the engine types	Basic engine nomenclature, engine classification	Theoretical lecture + practical experience	Paper test + practical test
2	8	Knowing the Four – stroke cycle and	Four – stroke cycle spark – ignition engine and its components, four –	Theoretical lecture +	Paper test +

		spark – ignition engine	stroke cycle compression ignition engine and its components	practical experience	practical test
3	8	Knowing the Two – stroke cycle types	Two – stroke cycle spark – ignition engine, Two – stroke cycle compression – ignition engine, comparison of two stroke and four stroke engine.	Theoretical lecture + practical experience	Paper test + practical test
4,5	8	Knowing the Valves timing for 4-stroke cycle & 2-stroke cycle	Valves timing for 4- stroke cycle spark – ignition engine and four – stroke cycle compression ignition engine, variable valve timing [VVT, CVVT]. Valves timing for 2- stroke cycle spark – ignition engine and 2- stroke cycle compression – ignition engine, Scavenging systems for 2- stroke engines.	Theoretical lecture + practical experience	Paper test + practical test
6-7-8	8	Knowing the Engine performance and testing	Engine performance and testing , performance parameters for 4-stroke engine and 2- stroke engine, basic measurements indicators. Illustrative examples	Theoretical lecture + practical experience	Paper test + practical test
9-2-11	8	Calculate the performance of engines.	Performance of S. I. Engine, performance of C. I. Engine,effect of variable compression ratio on engine performance. Effect of strength mixture (Fr) on engine performance factors	Theoretical lecture + practical experience	Paper test + practical test
12	8	Calculate the engine heat balance	Engine heat balance sheet. Illustrative examples	Theoretical lecture + practical experience	Paper test + practical test
13	8	Study the combustion	Combustion – Combustion equations, heat of combustion - Theoretical flame temperature - chemical equilibrium and dissociation - Theories of Combustion - Pre-flame reactions - Reaction rates. Combustion in S. I. Engines, stages of combustion in S. I. Engine	Theoretical lecture + practical experience	Paper test + practical test

14	8	Study the effect of engine variables on combustion	Effect of engine variable on stages of combustion in S. I. Engine. Flame structure and speed, Cycle by cycle variations, Lean burn combustion, stratified charge combustion systems.	Theoretical lecture + practical experience	Paper test + practical test
15,16	8	Knowing the knocking in engines	Detonation or knocking in S. I. Engine, what, why, control, & octane, effects of detonation, Control of duration, pre-ignition, effect of pre-ignition on engine.	Theoretical lecture + practical experience	Paper test + practical test
2025	8	Study the combustion in S.I. engines	S.I. engine combustion chamber designs	Theoretical lecture + practical experience	Paper test + practical test
18,19	8		Carburetion in S. I. Engine, Gasoline - air mixtures. Mixture requirements - Mixture formation - Carburetor, Chokes. Simple carburetor – calculation of the Air-fuel ratio for a simple carburetor, design of carburetor, venture size, fixed venturi and variable venturi and constant vacuum types,	Theoretical lecture + practical experience	Paper test + practical test
20	8	Study the injection system in engines	Injection fuel systems in S.I. engine, Pneumatic and Electronic Fuel Injection Systems, Ignition systems requirements, Timing Systems, breaker mechanism. Gasoline Injection – TBI, MPFI, GDI and Air-assisted Injection, Engine Management System, Mono point, Multi point, Direct injection systems and Air assisted systems – Principles and Features, Idle speed, lambda, knock and spark timing control.	Theoretical lecture + practical experience	Paper test + practical test
21	8	Study the functions and types of sensors	Sensors for Air flow, Pressure, Temperature, Speed, Exhaust Oxygen, Knock and Position in engine management systems –	Theoretical lecture + practical experience	Paper test + practical test

			Principle of operation, construction and characteristics.		
22	8	Study the Combustion in C. I engines	Combustion in C. I engines, stages of combustion in C.I. engine, variable affecting, stages of combustion	Theoretical lecture + practical experience	Paper test + practical test
23	8	Know the Diesel knocking	Diesel knock methods of controlling diesel knock	Theoretical lecture + practical experience	Paper test + practical test
24	8	Study the design of combustion chamber	C. I. Engine combustion chamber designs, Stages of combustion, vaporization of fuel droplets and spray formation, air motion, swirl measurement,	Theoretical lecture + practical experience	Paper test + practical test
25	8	Study the fuel injection in C.I. engines	Fuel injection in C. I. Engine, requirements of diesel injection system, types of injection systems, types of fuel injectors and nozzles	Theoretical lecture + practical experience	Paper test + practical test
26	8	Study the fuel specification s	Fuel, specification, fuels for S. I. Engines, Octane number requirement, additives, fuels for C. I. Engine, cetane number requirement, additives, alternate fuels. Fuel – Quality standards for Automotive Engines – Lead free gasoline, low and ultra – low sulphur diesels, LPG, CNG, Alcohols, Biodiesels, FT diesels, hydrogen.	Theoretical lecture + practical experience	Paper test + practical test
27	8	Study the Effect of supercharging on performance of the engine	Effect of supercharging on performance of the engine supercharging tipster- and supercharging, operation of turbocharger. Intercooling, Practical considerations for SI and CI engines	Theoretical lecture + practical experience	Paper test + practical test
28	8	Study the effect of additives on	Engine friction and lubrication, additives	Theoretical lecture + practical experience	Paper test + practical test

		lubrication in engines			
29 ,30	8	Study the pollution and emissions from engines	Pollutants from S. I. Engine, effect of engine maintenance on exhaust emissions, emissions control. Diesel emissions, diesel smoke and its control comparison diesel and gasoline emissions, Current trends in engine technology - Multi-valving, Tuned manifolding, camless valve gearing, EGR, Part-load charge stratification in GDI systems, Current materials and production processes for engine components, Hybrid electric vehicular piston engines and their characteristics. Noise pollution, EMISSION MEASUREMENT, EMISSION CONTROL, Engine Design modifications, fuel modification, evaporative emission control, EGR, air injection, thermal reactors, Water Injection, catalytic converters, Common rail injection system, Particulate traps, Nox converters, SCR systems. GDI and HCCI concepts.	Theoretical lecture + practical experience	Paper test + practical test

12. Infrastructure	
Required reading: CORE TEXTS COURSE MATERIALS OTHERS	A systematic book on the studied subjects and any new lectures prepared by the instructor on the subject.
Special requirements (include for example workshops, periodicals, IT software, websites)	Books, periodicals, software and modern websites related to the subject.
Community-based facilities (include for example, guest Lectures, internship, field studies)	Recent research and scientific journals in the field of competence. The sites of universities, institutes and specialized research centers, engineering and technical sites, as well as the sites of major car companies in the world.

13. Course Development Plan
Searching for the latest scientific developments in this subject, and collecting scientific material on modern car systems, as well as finding sufficient sources about developments in

car technology, and hybrid cars in order to add them to the curriculum in a way that serves its development and keeping pace with the development in automotive science.	
Pre- requests	
Minimum number of students	60
Maximum number of students	120